

**WHAT IS CLAIMED IS:**

1 ~~1. A method for enhancing the resolution of black image regions~~  
2 rendered at a resolution of color image regions, the black image regions and color  
3 image regions being represented by pixels, the black image regions and color image  
4 regions having a first resolution, the first resolution being lower than a maximum  
5 black printing resolution of a printer, the method comprising:  
6 generating black pixels and color pixels at said first resolution;  
7 for each original pixel of the black image region having the first resolution,  
8 multiplying said pixel in two dimensions to obtain a first array of  
9 pixels, so as to represent the original pixel by a plurality of target  
10 pixels in the first array;  
11 selecting a plurality of neighboring pixels, said target pixels and neighboring  
12 pixels constituting a pixel window;  
13 applying the pixels in the pixel window to a logic circuit having a plurality of  
14 logical conditions;  
15 determining enhanced resolution pixels for the target pixels based on whether  
16 said pixel window meets a logical condition; and  
17 printing said enhanced resolution pixels at a second resolution as well as said  
18 color pixels at said first resolution.

1 2. The method as recited in claim 1, the method further comprising:  
2 forming a processed pixel image by repeating the selecting through the  
3 determining steps until all of the original pixels have been processed.

1 3. The method as recited in claim 1 wherein the first resolution is 300  
2 dots per inch (dpi) and the second resolution is 600 dpi.  
3

1 4. The method as recited in claim 1, further comprising empirically  
2 determining the logical conditions.

1       ~~5. The method as recited in claim 1, wherein said step of printing further~~  
2 comprises printing black pixels rendered at the second resolution.

1       6. The method as recited in claim 1 wherein the pixel window has rows  
2 represented by bits equal to or less than a word size.

1       7. The method as recited in claim 1 wherein the pixels in the pixel  
2 window form a 13x13 pixel matrix.

1       8. An apparatus for enhancing the resolution of black image regions  
2 rendered at a resolution of color image regions, the black image regions and color  
3 image regions being represented by pixels, the black image regions and color image  
4 regions having a first resolution, the first resolution being lower than a maximum  
5 black printing resolution of a printer, the apparatus comprising:  
6       an upscaling circuit for multiplying black pixels to form a first array of black  
7       pixels, said first array including a group of target pixels;  
8       a logic circuit for receiving said target pixels and neighboring pixels, forming  
9       a window of pixels, said logic circuit applying logical conditions to  
10      said window of pixels and identifying enhanced resolution pixels for  
11      said group of target pixels; and  
12      at least one printhead for printing said enhanced resolution pixels at a second  
13      resolution and color pixels at said first resolution.

1       9. The apparatus as recited in claim 8, wherein the logic circuit  
2 comprises a logic array.

1       10. The apparatus as recited in claim 8 wherein the first resolution is  
2 300 dots per inch (dpi) and the second resolution is 600 dpi.

1 11. The apparatus as recited in claim 8 wherein the logical conditions are  
2 empirically derived.

1 12. A method for enhancing black image regions of a pixel field that are  
2 rendered at the same first resolution of color image regions, the method comprising:  
3 separating black pixels from color pixels to form a black pixel field;  
4 multiplying the number of pixels in the black pixel field to form a first pixel  
5 array;  
6 forming a sub-array of the first pixel array, the sub-array including a target  
7 group of pixels;  
8 applying the sub-array to a logic circuit identifying a plurality of logical  
9 conditions;  
10 based on whether the sub-array meets a logical condition, modifying said  
11 target group of pixels to reduce jagged edges of said black image  
12 regions; and  
13 printing the modified target group of pixels at an increased resolution and  
14 printing color pixels at said first resolution.

1 13. The method as recited in claim 12 wherein said multiplying is  
2 performed by upscaling.

1 14. The method of claim 13 wherein the initial resolution of the black  
2 pixel field is 300 dots per inch (dpi), and the resolution of the modified target pixels  
3 is 600 dpi.